Effects of seasonal herbicide applications with and without disking on tall fescue renovation and resulting habitat for bobwhites

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Introduction

Northern bobwhite (*Colinus virginianus*) (hereafter bobwhite) populations have declined considerably since 1970, primarily as a result of habitat loss. Changes in land-use practices have resulted in loss or degradation of early successional plant communities. One concern is the widespread use of tall fescue (*Lolium arundinaceum*), which provides poor quality habitat for bobwhites and other wildlife. To address this problem, the Northern Bobwhite Conservation Initiative (NBCI) has promoted conversion of tall fescue to native warm-season grasses (nwsg), especially on lands enrolled in the Conservation Reserve Program (CRP). Planting nwsg, however, may not be necessary to create desirable bobwhite habitat depending on the composition of the seedbank.

Our objective was to determine effective methods for renovating tall fescue fields using seasonal herbicide applications and disking.

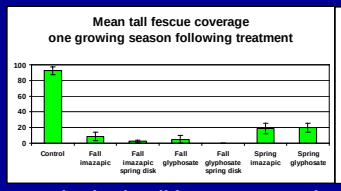
Methods

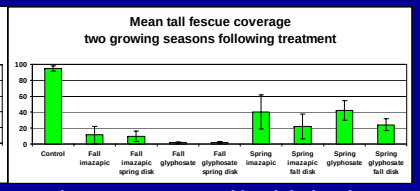
Eight treatments with control areas were replicated within each of 3 tall fescue fields across Tennessee, 2003 – 2004, in a randomized complete block design. Treatments included fall application of glyphosate (Gly-4 at 2qts/acre) and fall application of imazapic (Plateau at 12 oz/acre), both with and without disking the following spring, and spring application of glyphosate and spring application of imazapic, both with and without disking the following fall.

Vegetation structure and species composition were recorded June – August and November, 2004, and February, April, and June – August, 2005. Invertebrate abundance and biomass were recorded in the early (June) and late (August) growing season, 2004 and 2005. Seed rain was monitored summer 2004 through winter 2005. Soil loss was estimated using RUSLE 2 software. Here, we provide results for vegetation structure and species composition.

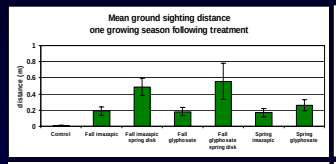
Results

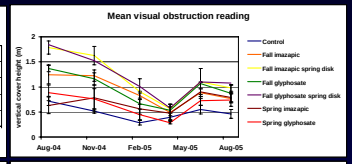
We recorded more than 150 plant species across all sites during the growing season, 2004 and 2005. All treatments reduced tall fescue coverage ($P < 0.001$) one growing season after treatment application. Fall glyphosate, fall glyphosate followed by spring disking, fall imazapic, and fall imazapic followed by spring disking reduced tall fescue coverage more effectively than spring herbicide applications two growing seasons after treatment.

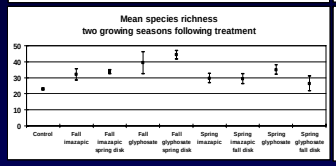


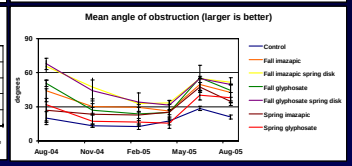


Reduction in tall fescue coverage improved openness at ground level during the brooding season ($P = 0.029$) and overhead and vertical cover during the wintering period ($P = 0.006$) for bobwhites. Mean species richness increased ($P = 0.008$) in the second growing season following fescue renovation.





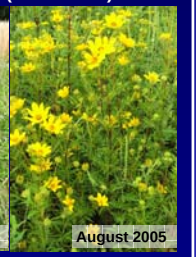




Disking following herbicide applications increased forb coverage ($P < 0.001$) across all sampling periods, including bobwhite food plants ($P = 0.041$), such as common ragweed (*Ambrosia artemisiifolia*), beggar's-lice (*Desmodium* spp.), and beggar-ticks (*Bidens* spp.), during the first growing season following disking. Imazapic applications increased coverage of desirable warm-season grasses ($P = 0.019$), such as broomsedge (*Andropogon virginicus*), and provided control of some undesirable species, such as johnsongrass (*Sorghum halepense*); however, at 2 study sites, imazapic increased coverage of orchardgrass (see sidebar).

glyphosate – October 2003
disk – March 2004

imazapic – November 2003



glyphosate – April 2004
disk – October 2004

Discussion

Fall glyphosate applications are recommended to eradicate tall fescue. After tall fescue is killed, a pre-emergence application of imazapic the following spring may be necessary to control undesirable species. This treatment has great potential throughout the mid-South where broomsedge and many desirable forbs are present in the seedbank. We do not believe big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), indiangrass (*Sorghastrum nutans*), sideoats grama (*Bouteloua curtipendula*) or switchgrass (*Panicum virgatum*) provide any better wildlife habitat than broomsedge. Planting nwsg, however, may be necessary where a desirable seedbank is not present. Disking prior to April is recommended to stimulate desirable forbs and improve habitat for bobwhites. Disking in April and May is more likely to stimulate undesirable plants, such as johnsongrass, crabgrass (*Digitaria* spp.), broadleaf signalgrass (*Urochloa platyphylla*), and sicklepod (*Senna obtusifolia*). Properly managed fallow areas provide excellent wildlife habitat even without much coverage of nwsg. Interspersion of managed unplanted old-fields and planted nwsg fields can be used to increase habitat diversity.

Acknowledgements:

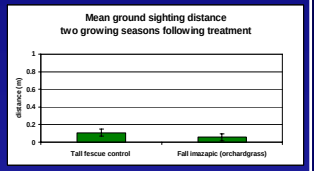
USDA-NRCS/MSU Bobwhite Restoration Project

What about orchardgrass?

Although biologists agree tall fescue does not provide quality vegetation structure and composition for bobwhites, there is not complete agreement regarding other non-native perennial cool-season grasses. For example, some managers regard orchardgrass "bobwhite friendly" and recommend it in wildlife seed mixtures. We have found orchardgrass structurally identical to tall fescue when present in similar densities.

Two "fescue fields" in this study contained orchardgrass (19.0 ± 7.3 percent cover) prior to treatment. Within these fields, fall imazapic applications reduced tall fescue coverage (1.0 ± 0.2) and released the existing orchardgrass (74.0 ± 7.3). We failed to detect a difference ($P = 0.4471$) in openness at ground level between plots infested with orchardgrass and control plots.

We do not believe money should be spent planting another non-native grass that provides the same structural characteristics as tall fescue, especially when fallow field management provides better habitat.



tall fescue control

imazapic – October 2003

glyphosate – October 2003
disk – March 2004

Orchardgrass…

- provides dense structure at ground level – limits travel within field
- cannot be controlled with imazapic
- suppresses seedbank; has no seed value; provides poor forage

Deer don't like orchardgrass either!

Data from an ongoing study of deer forage preference in Tennessee consistently ranks orchardgrass last when compared to other cool-season forages.

	Forage production (Oct – Apr) (lbs dry matter)	Percent consumed	% CP	% ADF
oats	8383	49	26	18
wheat	8163	49	25	19
crimson clover	6459	83	28	18
orchardgrass	4452	1	16	33